Claims

I claim:

1. A multilayer packaging film having at least four layers arranged in sequence comprising:

(1) a first layer comprising at least 50% by weight of a copolymer of propene, and at least one α-olefin selected from the group consisting of ethylene, butene-1, methylpentene-1, hexene-1, octene-1, decene-1 and mixtures thereof, said copolymer having a propene content of at least 60 wt. %, a Tm between about 100°C and about 145°C, a Mw/Mn of between 1 and 5, and n-hexane extractables of less than 5 wt. %;

(2) second and fourth layers each comprising:

(a) at least 10 wt. % of a first copolymer of ethylene and at least one C4 - C8 α-olefin, said copolymer having a density of from 0.900 to 0.915 g/cm3 and a melt index of less than 2 dg/min.,

(b) at least 10 wt. % of a second copolymer of ethylene with from 4 to 18 wt. % of a vinyl ester, alkyl acrylate, acrylic or methacrylic acid, and

(c) from 0 to 60 wt. % of a third copolymer of ethylene and at least one C3 - C8 α-olefin having a density less than 0.900 g/cm3 and a melting point less of between 65-98°C.; and

(3) a third layer comprising at least 80% by weight of at least one copolymer of vinylidene chloride with from 2-20 wt. % (based on said copolymer) of vinyl chloride or methyl acrylate.

2. The film of claim 1 wherein the first layer comprises a propylene-ethylene copolymer.

3. The film of claim 1 wherein the first layer comprises at least 75% by weight propylene-ethylene copolymer.

4. The film of claim 1 wherein said propene content of the first layer copolymer is at least 80% based on the weight of the copolymer.

5. The film of claim 1 wherein said propene content of the first layer copolymer is at least 90% based on the weight of the copolymer.

6. The film of claim 1 wherein the first layer consists essentially of propylene-ethylene copolymer.

7. The film of claim 1 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C.

8. The film of claim 1 wherein in the copolymer of the first layer the Tm is between about 120°C and 130°C.

9. The film of claim 1 wherein in the copolymer of the first layer the n-hexane extractables are less than 4 wt. %.

10. The film of claim 1 wherein in the copolymer of the first layer the n-hexane extractables are less than 2.6 wt. %.

11. The film of claim 1 wherein in the copolymer of the first layer the n-hexane extractables are less than 2 wt. %.

12. The film of claim 1 wherein in the copolymer of the first layer the n-hexane extractables are less than 1 wt. %.

13. The film of claim 1 wherein in the copolymer of the first layer the Mw/Mn is less than 3.

14. The film of claim 1 wherein in the copolymer of the first layer the Mw/Mn is between 1.5 and 2.5.

15. The film of claim 1 wherein in the copolymer of the first layer the Mw/Mn is less than 3 and the n-hexane extractables are less than 2.6 wt. %.

16. The film of claim 1 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C, and the n-hexane extractables are less than 2.6 wt. %.

17. The film of claim 1 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C, and the Mw/Mn is less than 3.

18. The film of claim 1 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C, the Mw/Mn is less than 3 and the n-hexane extractables are less than 2.6 wt. %.

19. The film of claim 18 wherein in the copolymer of the first layer the Mw/Mn is between 1.5 and 2.5.

20. The film of claim 18 wherein in the copolymer of the first layer the n-hexane extractables are less than 2 wt. %.

21. The film of claim 18 wherein in the copolymer of the first layer the n-hexane extractables are less than 1 wt. %.

SWB #21

22. A multi-layer biaxially oriented heat-shrinkable packaging film comprising:

(1) a first layer comprising at least 50% by weight of a copolymer of propene, and at least one α-olefin selected from the group consisting of ethylene, butene-1, methylpentene-1, hexene-1, octene-1, decene-1 and mixtures thereof, said copolymer having a propene content of at least 60 wt. %, a Tm between about 100°C and about 145°C, a Mw/Mn of between 1 and 5, and n-hexane extractables of less than 4 wt. %;

(2) a second layer comprising:

(a) at least 10 wt. % of a first copolymer of ethylene and at least one C_4 - C_8 α-olefin, said copolymer having a density of from 0.900 to 0.915 g/cm^3 and a melt index of less than 2 dg/min.,

(b) at least 10 wt. % of a second copolymer of ethylene with from 4 to 18 wt. % of a vinyl ester, alkyl acrylate, acrylic or methacrylic acid, and

(c) from 0 to 60 wt. % of a third copolymer of ethylene and at least one C_3 - C_8 α-olefin having a density less than 0.900 g/cm^3 and a melting point less of between 85-98°C.; and

(3) a transition layer between and in contact with said first layer and said second layer, the transition layer comprising:

(a) at least 20% by weight of a fourth copolymer of propene, and at least one α-olefin selected from the group consisting of ethylene, butene-1, methylpentene-1, hexene-1, octene-1, decene-1 and mixtures thereof, said copolymer having a propene content of at least 60 wt. %, a Tm between 100°C and 145°C, a Mw/Mn of between 1 and 5, and n-hexane extractables of less than 4 wt. %;

(b) at least 20% by weight of a fifth copolymer of ethylene and at least one C_4 - C_8 α-olefin, said copolymer having a density of from 0.900 to 0.915 g/cm^3 and a melt index of less than 2 dg/min., and

(c) from 0 to 60 wt. % of a sixth copolymer of ethylene and at least one C_3 - C_8 α-olefin having a density less than 0.900 g/cm^3 and a melting point less of between 65-98°C.

23. The film of claim 22 wherein the transition layer comprises at least 50 wt. % of either the fourth copolymer or the fifth copolymer.

24. The film of claim 22 wherein the transition layer comprises about 3% of the total thickness of the film.

25. The film of claim 22 wherein the first layer comprises a propylene-ethylene copolymer.

26. The film of claim 22 wherein the first layer comprises at least 75% by weight propylene-ethylene copolymer.

27. The film of claim 22 wherein said propene content of the first layer copolymer is at least 80% based on the weight of the copolymer.

28. The film of claim 22 wherein said propene content of the first layer copolymer is at least 90% based on the weight of the copolymer.

29. The film of claim 22 wherein the first layer consists essentially of propylene-ethylene copolymer.

30. The film of claim 22 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C.

31. The film of claim 22 wherein in the copolymer of the first layer the Tm is between about 120°C and 130°C.

32. The film of claim 22 wherein in the copolymer of the first layer the n-hexane extractables are less than 4 wt. %.

33. The film of claim 22 wherein in the copolymer of the first layer the n-hexane extractables are less than 2.6 wt. %.

34. The film of claim 22 wherein in the copolymer of the first layer the n-hexane extractables are less than 2 wt. %.

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35. The film of claim 22 wherein in the copolymer of the first layer the n-hexane extractables are less than 1 wt. %.

36. The film of claim 22 wherein in the copolymer of the first layer the Mw/Mn is less than 3.

37. The film of claim 22 wherein in the copolymer of the first layer the Mw/Mn is between 1.5 and 2.5.

38. The film of claim 22 wherein in the copolymer of the first layer the Mw/Mn is less than 3 and the n-hexane extractables are less than 2.6 wt. %.

39. The film of claim 22 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C, and the n-hexane extractables are less than 2.6 wt. %.

40. The film of claim 22 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C, and the Mw/Mn is less than 3.

41. The film of claim 22 wherein in the copolymer of the first layer the Tm is between about 110°C and 130°C, the Mw/Mn is less than 3 and the n-hexane extractables are less than 2.6 wt. %.

42. The film of claim 41 wherein in the copolymer of the first layer the Mw/Mn is between 1.5 and 2.5.

43. The film of claim 41 wherein in the copolymer of the first layer the n-hexane extractables are less than 2 wt. %.

44. The film of claim 41 wherein in the copolymer of the first layer the n-hexane extractables are less than 1 wt. %.

45. The film of claim 22 further comprising:

a third layer comprising:

at least 80% by weight of at least one copolymer of vinylidene chloride with from 2-20 wt. % (based on said copolymer) of vinyl chloride or methyl acrylate.

46. The film of claim 45 further comprising:

a fourth layer comprising:

(a) at least 10 wt. % of a seventh copolymer of ethylene and at least one C_4 - C_8 α-olefin, said copolymer having a density of from 0.900 to 0.915 g/cm^3 and a melt index of less than 2 dg/min.,

(b) at least 10 wt. % of a eighth copolymer of ethylene with from 4 to 18 wt. % of a vinyl ester, alkyl acrylate, acrylic or methacrylic acid, and

(c) from 0 to 60 wt. % of a ninth copolymer of ethylene and at least one C_3 - C_8 α-olefin having a density less than 0.900 g/cm^3 and a melting point less of between 65-98°C.

47. The film of claim 46 wherein the layers are arranged in contact and in the following sequence: first layer, transition layer, second layer, third layer and fourth layer.

48. A multilayer packaging film formable into a pouch by heat sealing for use in food preparation consisting essentially of:

(1) an inner sealing layer comprising at least 50% by weight of a copolymer of propene, and at least one α-olefin selected from the group consisting of ethylene, butene-1, methylpentene-1, hexene-1, octene-1, decene-1 and mixtures thereof, said copolymer having a propene content of at least 60 wt. % , a Tm between about 100°C and about 145°C, a Mw/Mn of between 1 and 5, and n-hexane extractables of less than 5 wt. % ;

(2) a second layer in contact with the inner sealing layer comprising:

(a) at least 10 wt. % of a first copolymer of ethylene and at least one C_4 - C_8 α-olefin, said copolymer having a density of from 0.900 to 0.915 g/cm^3 and a melt index of less than 2 dg/min.,

(b) at least 10 wt. % of a second copolymer of ethylene with from 4 to 18 wt. % of a vinyl ester, alkyl acrylate, acrylic or methacrylic acid, and

(c) from 0 to 60 wt. % of a fourth copolymer of ethylene and at least one C_3 - C_8 α-olefin having a density less than 0.900 g/cm^3 and a melting point less of between 65-98°C.; and

(3) an optional third layer comprising a protective outer layer.

49. The film of claim 48 wherein the third layer comprises nylon.

50. The film of claim 48 wherein the third layer comprises at least 50% by weight of a copolymer of propene, and at least one α-olefin selected from the group consisting of ethylene, butene-1, methylpentene-1, hexene-1, octene-1, decene-1 and mixtures thereof, said copolymer having a propene content of at least 60 wt. %, a Tm between about 100°C and about 145°C, a Mw/Mn of between 1 and 5, and n-hexane extractables of less than 5 wt. %.

51. The film of claim 48 wherein in the copolymer of the inner sealing layer the Tm is between about 110°C and 130°C.

52. The film of claim 48 wherein in the copolymer of the inner sealing layer the Tm is between about 120°C and 130°C.

53. The film of claim 48 wherein in the copolymer of the inner sealing layer the n-hexane extractables are less than 4 wt. %.

54. The film of claim 48 wherein in the copolymer of the inner sealing layer the n-hexane extractables are less than 2.6 wt. %.

55. The film of claim 48 wherein in the copolymer of the inner sealing layer the n-hexane extractables are less than 2 wt. %.

56. The film of claim 48 wherein in the copolymer of the inner sealing layer the n-hexane extractables are less than 1 wt. %.

57. The film of claim 48 wherein in the copolymer of the inner sealing layer the Mw/Mn is less than 3.

58. The film of claim 48 wherein in the copolymer of the inner sealing layer the Mw/Mn is between 1.5 and 2.5.

59. The film of claim 48 wherein in the copolymer of the inner sealing layer the Mw/Mn is less than 3 and the n-hexane extractables are less than 2.6 wt. %.

60. The film of claim 48 wherein in the copolymer of the inner sealing layer the Tm is between about 110°C and 130°C, and the n-hexane extractables are less than 2.6 wt. %.

61. The film of claim 48 wherein in the copolymer of the inner sealing layer the Tm is between about 110°C and 130°C, and the Mw/Mn is less than 3.

62. The film of claim 48 wherein in the copolymer of the inner sealing layer the Tm is between about 110°C and 130°C, the Mw/Mn is less than 3and the n-hexane extractables are less than 2.6 wt. %.

63. The film of claim 62 wherein in the copolymer of the inner sealing layer the Mw/Mn is between 1.5 and 2.5.

64. The film of claim 62 wherein in the copolymer of the inner sealing layer the n-hexane extractables are less than 2 wt. %.

65. The film of claim 62 wherein in the copolymer of the inner sealing layer the n-hexane extractables are less than 1 wt. %.

66. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Tm is between about 110°C and 130°C.

67. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Tm is between about 120°C and 130°C.

68. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the n-hexane extractables are less than 4 wt. %.

69. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the n-hexane extractables are less than 2.6 wt. %.

70. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the n-hexane extractables are less than 2 wt. %.

71. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the n-hexane extractables are less than 1 wt. %.

72. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Mw/Mn is less than 3.

73. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Mw/Mn is between 1.5 and 2.5.

74. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Mw/Mn is less than 3 and the n-hexane extractables are less than 2.6 wt. %.

75. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Tm is between about 110°C and 130°C, and the n-hexane extractables are less than 2.6 wt. %.

76. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Tm is between about 110°C and 130°C, and the Mw/Mn is less than 3.

77. The film of claim 50 wherein in the copolymers of the inner sealing layer and the outer layer the Tm is between about 110°C and 130°C, the Mw/Mn is less than 3 and the n-hexane extractables are less than 2.6 wt. %.

78. The film of claim 77 wherein in the copolymers of the inner sealing layer and the outer layer the Mw/Mn is between 1.5 and 2.5.

79. The film of claim 77 wherein in the copolymers of the inner sealing layer and the outer layer the n-hexane extractables are less than 2 wt. %.

80. The film of claim 77 wherein in the copolymers of the inner sealing layer and the outer layer the n-hexane extractables are less than 1 wt. %.